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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|-------------------------|------------------------|
| 09/625,094 | 07/25/2000 | Frederick M. Disenzo | 00RE089 | 6257 |
| 7590 Allen-Bradley Company Inc Attention John J Horn Patent Dept 704P Floor 8 T-29 1201 South Second Street Milwaukee, WI 53204 | | | EXAMINER LEE, HWA S | |
| | | | ART UNIT 2886 | PAPER NUMBER |
| | | | MAIL DATE 03/25/2008 | DELIVERY MODE PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

09/625,094

Applicant(s)

DISCENZO, FREDERICK M.

Examiner

Hwa S. Lee (Andrew)

Art Unit

2886

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 3/17/08.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21, 24-27, 37-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 37-43 is/are allowed.
- 6) ☐ Claim(s) 1, 3-7, 14, 16-19 and 24 is/are rejected.
- 7) ☒ Claim(s) 2, 8-13, 15, 20, 21 and 25-27 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

Claim Objections

1. Claim 8 is objected to because of the following informalities: the word "and" appears to be missing between "bearing" and "at least". Appropriate correction is required.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 16 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Meinzer et al (US 5,640,472).

Meinzer et al (Meinzer hereinafter) show a fiber optic sensor for magnetic bearings comprising (e.g. Figure 6):

a light source (100);

at least one optical fiber (54) at least part of which is embedded in a bearing (10, 12), the at least one optical fiber having first and second ends, the first end receiving the beam of light, the second end (161) being flush with a contacting surface of the bearing; and

a measuring system (120) operatively coupled to the optical fiber;

wherein the optical fiber provides the measuring system with information (gap) relating to the at least one condition of the bearing.

As to claim 24, Meinzer shows:

providing a bearing (10, 12) having an optical fiber embedded therein, the optical fiber having first and second ends, the first end receiving the beam of light, the second end being flush with a contacting surface of the bearing;

using a measuring system (120) operatively connected to the optical fiber to collect information relating to the optical fiber; and

using a processor (124) operatively coupled to the measuring system to determine the at least one condition of the bearing based on the information.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3-7, 14, and 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meinzer as applied to claim 1 above and further in view of Mamin et al. (US 5,017,010).

Meinzer shows all the elements as discussed above but does not show the measuring system using interferometry to measure the gap.

Mamin et al (Mamin hereinafter) shows an interferometric fiber optic position sensor that measures the distance of an object with high sensitivity (e.g. Figure 2).

At the time of the invention, one of ordinary skill in the art would have modified the fiber optic position sensor of Meinzer to use the interferometric fiber optic position sensor of Mamin in order to improve sensitivity and improve the accuracy of the gap measurement (claim 17).

As to claims 3 and 18, the fiber optic would have a length that is parallel to the direction of wear of the bearing.

As to claims 4 and 5, Mamin shows a reference beam (x) and a measuring beam (y) in Figure 2 where both beams combine to interfere (column 3, lines 60+).

As to claims 6 and 7, Figure 3 is a graphical representation of the high and low light intensity (interference fringes). Although Mamin does not expressly teach that the fringes are counted, counting of fringes are well known in the art. In addition, Mamin teaches that an amplitude change from minimum to maximum is equivalent to a displacement of $1/4$ wavelength (column 4, lines 29+) and therefore, the counting of peaks would be indicative of the displacement.

As to claim 14, Meinzer shows a sleeve bearing.

As to claim 15, multiplexing multiple interferometric fiber optic sensors is well known in the art of interferometers and one of ordinary skill in the art would have been motivated to do so in order to make multiple measurements.

Allowable Subject Matter

4. Claims 37-43 are allowed.

5. Claims 2, 8-13,15, 20, 21, and 25-27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

6. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. Kapaan (US 4,438,987) shows fiber optics embedded in a bearing wherein the fiber end is flush with a surface of a bearing.
- b. Childs (US 6,518,770) shows fiber optic strain sensors embedded in a bearing.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hwa S. Lee (Andrew) whose telephone number is 571-272-2419. The examiner can normally be reached on Mon, Tue, Thurs, and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tarifur R. Chowdhury can be reached on 571-272-2800. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Hwa S. Lee (Andrew)/
Primary Examiner, Art Unit 2886